

REMARKS

The only issue outstanding in the Office Action mailed January 29, 2009 is the rejection under 35 U.S.C. Reconsideration thereof is respectfully requested.

Claims 1-10 have been rejected as being allegedly obvious over Ono et al. (JP 10-83821) in view of Watarai et al. (JP 2003-77539).

Ono et al. discloses a polymer electrolyte comprising a polymer having a recurring molten salt monomer unit. See, formula 8 in paragraph [0047]. The method of producing this polymer disclosed in Example 8 in paragraphs [0045] – [0048] comprises polymerizing 1-ethyl-3-vinylimidazolium TFSI in the presence of LiTFSI. Similar polymer having formula 9 is disclosed in paragraph [0049] and [0050] and produced from 1, 3-dimethyl-4(5)-vinylimidazolium TSFI. Other polymers disclosed in Ono et al. are not polymers produced from a molten salt monomer having a quaternary ammonium salt structure. Ono et al. does not disclose an electrochemically inert polymer reinforcing material such as PVDF.

Watarai et al. Discloses a gel polymer electrolyte comprising a non-aqueous electrolyte solution, a matrix polymer such as PVDF-HFP copolymer and a particulate polymer such as PVDF. The gel polymer electrolyte is prepared by dissolving the matrix polymer in a mixture of the non-aqueous electrolyte solution containing a lithium salt and a volatile solvent in which the matrix polymer is soluble. The particulate polymer is then dispersed in the resulting matrix polymer solution followed by applying the dispersion on the active substance layer side of a negative electrode sheet and drying to remove the volatile solvent. The negative electrode sheet carrying the gel polymer electrolyte layer is then joined with a cathode sheet to assemble a lithium ion battery. See, Example 1. The gel polymer electrolyte layer thus contains 60-95 wt.%, preferably 70-90 wt.% of the non-aqueous electrolyte solution.

In the Watarai et al's gel polymer electrolyte, only the non-aqueous electrolyte solution is ion conductive while the matrix polymer and the particulate polymer are not. Because the non-aqueous electrolyte solution as such is not suitable to use as an electrolyte of a lithium ion battery, a gel containing a large amount of the non-aqueous electrolyte solution is used. The matrix polymer such as PVDF-HFP is used as a gelling agent of the electrolyte solution, not as an

electrochemical inert reinforcing material as claimed herein. The particulate polymer such as PVDF is used as a filler. Watarai et al. discloses in paragraph [0039] that the mechanical strength of the gel polymer electrolyte will not be adversely affected by the inclusion of the particulate polymer since the particulate polymer itself may absorb, to some extent, the electrolyte solution to render it ion-conductive.

This combination of references accordingly does not suggest the composite polymer electrolyte composition of claim 1, which is not a gel in which a non-ion conductive polymer is dissolved in a large amount of a non-aqueous electrolyte solution. The matrix of the composite polymer electrolyte composition of claim 1 is an ion-conductive polymer which already occurs in the solid state. Accordingly, there is no need to solidify the polymer of claim 1 while it is imperative for Watarai et al. to solidify the non-aqueous electrolyte solution by gelling with the matrix polymer and the particulate polymer.

Watarai et al. does not teach or suggest to reinforce a polymer electrolyte with PVDF or a copolymer thereof in the absence of any liquid in which the reinforcing polymer is soluble. Consequently, the deficiency of Ono et al. is not remedied by Watarai et al.

Gan et al. (US 6,759,170) is applied to claims 12 and 13 to show that the charge transfer ion source listed in claim 12 is known. However, the deficiencies of Ono et al. and Watarai et al. are not remedied by Gan et al., and claims 12 and 13 are also not obvious.

Accordingly, withdrawal of all rejections is respectfully requested.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

/Harry B. Shubin/

Harry B. Shubin, Reg. No. 32,004
Attorney/Agent for Applicant(s)

MILLEN, WHITE, ZELANO
& BRANIGAN, P.C.
Arlington Courthouse Plaza 1, Suite 1400
2200 Clarendon Boulevard
Arlington, Virginia 22201
Telephone: (703) 243-6333
Facsimile: (703) 243-6410

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